SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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E PAST AND PRESENT CONDITION OF THE BRITISH MINES AND MINERS.

BY H. READER LACK, OF THE BOARD OF TRADE.

chief mineral productions of this country are those of coal, iron, , lead, and tin, which are raised in very large quantities. The d Kingdom is, moreover, noted as being the most favoured country world for the development of mineral industry. Fuel, the indis- ble agent in the treatment of metalliferous ores, and the most powerful nt in the production of motive force, is distributed unequally through- e three countries of England, Scotland, and Ireland. The coal for- n in these three divisions of the British empire occupies rich and -spread basins. The ores of iron, abundantly distributed in several coal basins, add greatly to the value of these; and each one so cir- anced has become the centre of a metalliferous district, where nu- s works produce iron at a price so moderate that no nation can com- ith this manufacture with any chance of success. In addition to dvantages, the insular position of Great Britain, which allows the be conveyed at a moderate expense wherever it is wanted, is equally ant in enabling the iron to be conveyed by its ships throughout the

COAL AND IRON.

quantity of coal and iron produced in the United Kingdom has, he publication of the volume above alluded to, been only approxi- ly known and variously estimated from time to time by different ers, and it is not, therefore, possible to give any comparative ac- of the present production with that of former years. Some idea progress of these mines may, however, be obtained by contrasting mber of miners employed at different periods; thus, for instance, pulation census for 1841 gives the total number engaged in the coal n mines as

	1841.	1854.
In coal mines	118,233	219,995
In iron ditto	10,949	26,109

increase of 94 per cent. in the coal, and 139 per cent. in the iron in 1854 over 1841.

and iron rank foremost in the list of minerals, on account of their ve production and value. The area of the British coal fields is es- l at 4,250,000 acres; and no less than 64,661,000 tons of coal were in the United Kingdom in the year 1854, valued at 14,975,000*l.* sum, 47,422,000 tons were raised in England, 9,643,000 in Wales, 00 in Scotland, and 148,000 in Ireland.

area of the French coal fields is about six times less than that of Britain, whilst their production is 16 times less.

total number of collieries in the United Kingdom in 1854 was 2327; , 1704 were situated in England, 306 in Wales, 368 in Scotland, in Ireland. The average number of tons raised to each workman ed in the United Kingdom in 1854 was 293; in France, in 1852, rage was only 136 tons to each workman engaged.

PIG-IRON.

production of pig-iron in the United Kingdom exceeds that of the l, and, in fact, of the whole European nations put together; and the produce of the United States, which ranks next in amount to our own, were thrown into the scale, the balance would still turn r of this country.

counties in which the manufacture of pig-iron is carried on to the extent are those of Staffordshire, Northumberland, Durham, North re, and Shropshire. Scotland and Wales also furnish large sup- ut the total make in Scotland or Wales, taken separately, falls that produced annually in the county of Stafford alone.

ollowing table shows the increase in this branch of the iron in- n 1854, as compared with 1825:—

Districts.	No. of Iron Works.		Furnaces in blast.		Tons of pig-iron produced.	
	1825.	1854.	1825.	1854.	1825.	1854.
ire	54	72	81	166	171,735	847,600
e	23	13	36	28	86,320	124,800
	14	14	22	21	35,308	73,444
re	9	13	14	25	19,184	127,500
les	9	7	8	9	13,100	32,900
les	37	48	82	121	223,520	750,000
berland, Durham, and Yorkshire	—	23	—	59	—	275,000
nd and Lancashire	13	2	2	3	3,000	20,000
rshire	—	4	—	5	—	21,990
	9	32	17	118	29,200	796,604
Total	168	228	262	555	581,367	3,069,838

this table, it appears that the quantity of pig-iron made in this in 1854 increased by no less than 428 per cent. the amount pro- the year 1825.

uantity of iron ore required to make a ton of pig-iron varies ac- o quality in the different counties: thus, for instance, in North- nd and Durham, 4 tons is stated to be about the average propor- Yorkshire and Derbyshire, 3 to 3¼ tons; and in Shropshire and hire, only 3 tons.

now glance at this branch of our mining industry as contrasted t of like nature in other countries. In the year 1851, the pro- f pig-iron in the United States amounted to 564,755 tons, and o 700,000 tons. In France, in the year 1852, the total produce on was 429,677 tons. The next in importance stands that of which is, however, considerably less than that of France, and, not worth including here. The production of Russia, Sweden, and Austria, are in each instance less than that of France. A le fact is the great difference in the average price of this article counties. In the United Kingdom, in 1854, the average price s. 9d. per ton; in the United States, in 1851, 4*l.* 12s.; and in n 1852, no less than 5*l.* 6s.

reat drawback to the cheap and extensive production of iron in rises from the dearness of fuel, and to its existence in parts of the emote from the iron districts, and thereby necessitating, in most , the conveyance of the ore for a distance of many miles to the and smelting-works, which involves a considerable outlay, and atly to enhance the price of the manufactured article. This ex- aved in this country by the proximity of the coal and iron, as d at the beginning of this paper.

sia, in Prussia, coal and iron are found similarly situated to the in Great Britain, but the coal is said to be inferior in quality to oal, and two-thirds of the iron are there made in charcoal fires. sperity of the iron manufacture in this country dates its com- nt from the introduction of the process of "puddling," by Mr. 783, by which process coal was substituted for its more costly or—charcoal. Previous to that date Great Britain obtained most of her manufactured iron from abroad, chiefly from Russia and Sweden. It is estimated that the consumption of timber in the year 1782, for the purpose of making bar-iron in this country, amounted to no less than 69,000 loads, rendering the price of iron more than double that produced by pit coal. So great indeed was the destruction of woods, &c., that in many countries the use of timber for charcoal fuel was prohibited by Act of Parliament, and, consequently, the production of pig-iron was comparative trifling in amount at that period to what it afterwards became under Mr. Cort's system.

COPPER, TIN, AND LEAD.

A similar comparison to that instituted with regard to the iron and coal mines may be made with reference to the increase in the number of miners employed in the copper, tin, and lead mines of the United Kingdom:—

No. of miners employed.	1841.	1854.
In copper mines	15,407	21,169
In tin ditto	6,101	14,761
In lead ditto	11,419	21,749

Showing an increase of 37 per cent. in copper mines, 133 per cent. in tin mines, and 90 per cent. in lead mines, in 1854, over those employed in 1841. In the case of copper and tin, however, we are not left entirely to these figures to enable us to mark the progress that has been made in these mines, for a register of the production of the tin and copper mines has been kept for a series of years.

In the year 1800, the quantity of tin produced amounted to 2522 tons; this amount was augmented to 4170 tons in 1825, and to 5768 tons in 1854. The amount of copper raised in the year 1820 was 8127 tons; in the year 1834, 14,042 tons; and in 1854, 13,042 tons. It will be observed that there has been a steady increase in the produce of tin, whilst the amount of copper has somewhat varied, it being 1000 tons less in 1854 than in 1834.

The value of tin and copper produced in the English mines in each of the years 1801 and 1854 was—Tin, in 1801, 254,722*l.*; and in 1854, 690,000*l.*, or an increase of 171 per cent.; and copper, in 1801, 476,313*l.*; and in 1854, 1,229,807*l.*, or an increase of 158 per cent. in 1854 over 1801.

LEAD.

Besides tin and copper, Great Britain produces large supplies of lead, the amount raised in 1854 being no less than 64,005 tons. With the exception of Spain, no country can enter into competition with Great Britain in the production of this mineral, but a larger per centage of metal is said to be extracted from the lead ores of Continental Europe than from those raised in the United Kingdom.

The total number of persons, male and female, engaged in mining operations in Great Britain, in each of the years 1841 and 1854, was—in 1841, 193,825; and in 1854, 303,977, or an increase of 57 per cent. in the number employed in the year 1854 over those in 1841. Although the increase in the number of miners employed in most of the mines is large, yet when the total number of mines is compared with the total population of the country, it appears that as far as affording the means of employment goes, the mines in this respect stand far below many other native industries. The proportion the numbers bore to every 100 persons being only 7-10ths in 1841, and 1 1-10th in 1854. It must not, however, be forgotten that the great improvements in the steam-engines used in mining of late years have tended in no small degree to the increased production of the mines on the one hand, and to a proportionate decrease in the number of hands employed to the increased amount produced on the other.

In consequence of the want of uniform general information in the several divisions of the subject for earlier years, the following table of the production and value of minerals in the United Kingdom in the year 1854 has been extracted from the "Mining Survey." It affords the best insight that can be obtained on this subject, and will also serve as a summary of the production and value already stated for the year 1854:—

Minerals, &c.	Quantities produced in 1854.	Value at place of production.
Tin	Tons 5,763	£ 690,000
Copper	,, 13,042	1,229,807
Lead	,, 64,005	1,472,115
Silver	Ounces 700,000	192,500
Iron (pig)	Tons 3,069,838	9,500,000
Coal (at pits)	,, 64,661,401	14,975,000
Zinc	—	16,500
Arsenic, &c.	—	500,000
Total		£28,575,922

With regard to the facts contained in this table, it is only necessary to remark that the quantities of coal and pig-iron which it states to have been produced, far exceeds the estimates previously formed. It was supposed that the produce of coal in the United Kingdom was about eight times greater than that of France, but from the above figures it must be nearly 16 times as much. The total value of the mineral production of the United Kingdom is about double that of France.

It may be interesting to know in what degree our exports of these native minerals has kept pace with their production, and to ascertain how far the imports of foreign minerals has increased or decreased of late years. The table below has been compiled for the purpose of showing the quantities of the principal kinds of metals in the unmanufactured state, imported and exported in each of the years 1820 and 1854:—

—	Total Imports.		Exports of British produce.		Exports of Foreign produce.	
	1820.	1854.	1820.	1854.	1820.	1854.
Coal Tons	—	—	249,119	4,119,712	—	—
Iron, in bars, unwrought	9869	41745	46,469	604,662	3909	4341
Pig	1	899	5,631	293,432	—	—
Steel, unwrought	—	1409	438	20,793	—	1340
Copper ore	—	50941	—	—	—	—
Regulus	—	6351	—	—	—	—
Unwrought	72	1597	2,057	3,040	—	857
Wrought, sheet, nails, &c.	—	710	1,906	5,111	—	—
Tin, in blocks, &c.	65	2551	1,292	1,405	152	668
Lead, pig and sheet	5	11858	18,300	17,857	5	199

From these figures it will be seen that a considerable increase has taken place in several kinds of minerals, both imported and exported, since the year 1820. The greatest increase has occurred in the quantities of coal, bar and pig-iron, and unwrought steel of British manufacture exported.

In addition to the above, the value of the hardwares and battery, and brass and copper manufactures, and tin plates, may also be taken into consideration, as these articles occupy an important place in the list of exports, and are immediately connected with the mining industry of the country. The total value of these articles, taken together, was, in the year 1832, 2,594,253, and in 1854, 6,716,340, or an increase of 159 per cent. in the year 1854 over that of 1832.

These tables, it is hoped, will be deemed sufficient to enable the reader to form an idea of the magnitude of the British mines, and of their importance to the country at large, for, without her coal and iron mines, England could never have reached the position she now occupies—that of the first manufacturing country in the world.

But we should, perhaps, be able to form a more correct idea of their value if we directed our attention to the almost countless machines in our factories, and foundries, and workshops, which owe their existence, in a great measure, to the abundant supplies of mineral fuel; and also to our railroads and steam-ships, to our iron bridges and palaces, and to the thousands of conveniences and even necessaries of life which are both cheaply and amply supplied to us by the prolific mineral resources of the soil. There is another feature connected with mining which must not be overlooked, and that is the condition of the persons employed in these mines, especially that of the women and children. The total number of persons employed in the various mines has already been stated, and the following table exhibits the age and sex of those persons:—

Mines, &c.	MALES.				FEMALES.			
	1841.		1854.		1841.		1854.	
	20 years, & upwards	Under 20.	20 years, & upwards	Under 20.	20 years, & upwards	Under 20.	20 years, & upwards	Under 20.
Coal	83,408	34,275	151,648	65,705	1185	1165	1352	1290
Iron	7,773	2,679	19,755	6,331	424	73	—	20
Copper	9,866	3,428	12,023	5,323	913	1200	1493	2352
Tin	4,602	1,349	8,574	4,305	68	82	843	1039
Lead	9,427	1,932	16,441	4,937	40	20	100	271
Other	24,162	6,591	79	46	472	491	28	21
Total	139,238	48,454	208,520	86,647	3102	3031	3816	4994

The increase of the different sexes was, therefore, males under 20, 79 per cent.; 20 years and upwards, 49 per cent.; and females, under 20, 64 per cent.; 20 years and upwards, 25 per cent., in 1854 over that of 1841.

It will be noticed that the number of females has not increased in so large a proportion as that of the males. The large increase in the number of males under 20 is, no doubt, to be accounted for by the fact of the prohibition, by Act of Parliament, in 1843, of the employment of females underground. The number of females employed in mining pursuits in 1854, although showing an increase as compared with the number similarly engaged in 1841, still bears a less proportion to the number of males in 1854 than in 1841; and it is greatly to be hoped that the salutary effects which were anticipated to result from the passing of the Act abovementioned have been fully realised.

There are no accounts of the number of children employed in mining, except in the classification in the preceding table of males and females under 20. By the Act of 1843, the employment of any child under ten years of age was also prohibited, but it does not appear that this regulation is always strictly adhered to, for children below that age are said to be employed as "trapper-boys."

The social position of the miner is, indeed, in many respects, open to great improvement, more especially in the provision of better dwellings, and the establishment of schools for the education of his children. As a class, the miners are but poorly educated, and the early age at which their children are employed in the mines prevents their attending, in any great measure, to the insufficient means provided for their instruction. According to the education census of 1851, there were 41 colliery schools in existence at that date, with 2013 male and 1498 female scholars; but the chief drawback to any advancement in the education of children in the mining districts doubtless arises from the non-existence of any desire on the part of their parents to have them instructed.

From all accounts, however, some progress has been made of late years in the establishment of evening schools, and attention has also been directed to the construction of their dwellings more in accordance with the demands of morality; and it may, therefore, be concluded that if very much has not been done, yet that the position of the mining population of the country has certainly improved, as compared with that which they occupied some few years back.

Thus much, then, has been gathered from the existing statistics on mining, and, in conclusion, it will only be necessary to make one or two remarks on the figures selected, in order to show their significance more clearly. It has tritely been said, "that if, on the one hand, our great mechanical inventions owe so much to the abundance and consequent cheapness of our fuel, it is no less true that some of these inventions have, on the other hand, materially assisted of late years in bringing about that abundance. Thus, had it not been for the invention of the steam-engine, a large proportion of our coal and other mines in existence now would, in all probability, not have been opened, or, if opened, quickly abandoned, after involving an enormous outlay of capital; so that it may be truly affirmed that what coal has done for the steam-engine, the steam-engine has done for coal and the other minerals. We would here direct attention to the fact, that the employment of steam-power of late years accounts for the smallness of the number of persons engaged in mining pursuits when compared with the increased production of the mines, and that its continual substitution for other power in mining operations will necessarily tend to decrease, in some degree, the number of hands required in individual mines; whilst, on the other hand, it is most likely to secure undertakings that could never be accomplished without its aid, and thereby, on the whole, perhaps, cause a slight annual increase in the total number of miners employed in the kingdom.

But this is not the only way in which steam may be said to cause an increase in the production of minerals (more especially of coal) in this country; the formation of railroads, with their facilities for conveying heavy goods, has caused a traffic between the coal mines of the midland counties and the metropolis; and of late years large supplies of coal from that district have been sent to the London market, from which it had hithertoo been excluded from the want of remunerative means of transport. The total amount of coal brought to London in 1854 by the various routes of railways, canals, and coasting vessels, was as follows:—

By coasting vessels	Tons 3,399,561
Railways	945,056
Canals	32,164
Total	4,376,781

This sum nearly equals in amount the total annual produce of the whole of the French coal mines, and is more than half the total quantity annually consumed in France—the total amount of coal consumed in that country in the year 1852 amounting only to 7,816,403 tons, of which upwards of 3,000,000 tons were of foreign production.

But, in recording the progress of our mines we must not omit to mention the important part that Science has taken in bringing about their development. The improved method of working the mines, as well as of the preparation of the ores, are the results of the application of scientific principles in the several stages of production; and it is to this aid, as much

as to any other cause, that the present cheapness and abundance of our mineral productions is due.

In the hope that Science will still continue to afford her helping hand to this most important branch of our native wealth, I conclude, trusting that those who may have had patience enough to follow me in my description of the British mines may have gained some information, if not amusement, from the perusal of this rather dry subject.

TO THE COAL MINERS OF ENGLAND.

FELLOW-WORKMEN,—In the last letter which I had the honour to address to you, there is a brief, but, I trust, a faithful account of the proceedings of the Home Secretary, the Committee of the House of Commons, and the august assembly at Craven Hotel, in respect to the measures which have been adopted with a view to diminish the fatal accidents to which we are exposed, and improve the mental and social degradation to which we have been reduced—by what? by their cupidity and grasping ambition for wealth and political power. And now, I must again respectfully claim your indulgence in my humble attempt to give you an explicit description of a few of the last scenes in this most eventful drama—viz., the appointment of examiners and Government inspectors of coal mines. Before, however, lifting the curtain which hides from the vulgar gaze the dark deeds of intriguing moneyed despotism, and the favouritism of the Chairman of the Committee of the House of Commons, I shall quote, for the information of Sir George Grey in the execution of his public trust, the admirable words of Seneca, "*Iniqua nunquam regna perpetua manent*"—that is, "Authority, founded or maintained by injustice, is never of long duration." It is a painful reflection, from which there is no possible way of escape, if the acts of Sir George Grey, the Committee of the House o Commons, the examiners of Government inspectors of coal mines, are carefully and honestly considered, that the man of toil, however high his intelligence may reach, however extensive and minute his experience of mining details may be, however familiar study and stern necessity have made him with abstract and practical science, still he has no chance whatever to gratify a noble and praiseworthy ambition in the exercise of commanding talents to benefit himself and improve his fellow-workmen, by showing the advantages of education in the ordinary avocations of practical life. These qualifications, apart from the distinguished position, "ten years' managers," are as valueless in the estimation of moneyed despots and scientific viewers as honesty, prudence, and ability to execute the delicate practical requirements of mining on the part of the great majority of the present Inspectors of coal mines. Will you not, then, fellow-workmen, lift up your manly voices and your sinewy arms, as the seers of old did when contending with the Amalekites, and say, with a respectful, but with a firm determination, this deadening policy on the part of clanism and moneyed interest shall not henceforth prevail against the just and urgent solicitations of intelligence, competency, and worth.

Examiners of candidates for the situation of Government Inspectors are appointed, with an intimation, in full accordance with their own wishes and dictum, from the servile place-hunting authorities, that no practical coal miner shall be considered eligible, not even to pass an examination, except he has had the management of a coal mine for ten years, or has been fortunate enough to serve an apprenticeship with Mr. Wood, one of the examiners, or Mr. Hutchins, the Chairman of the Committee of the House of Commons. This is, indeed, a glorious advent of putting the right man in the right place, and it introduces us to a singular and most anomalous phase in the proceedings of the Home office, which is perplexing in the extreme; for, notwithstanding the agreement between the Secretary of State and the scientific viewers, that "ten years' managers" only were to be appointed, in direct opposition, as I think, to the spirit of the Act of Parliament, still, Sir George Grey must persevere in the unjustifiable course of adding insult to contumely, by sending for candidates from a distance of 300 miles, at a great expense and inconvenience, when he knew, from the replies which his own queries had elicited, that they had not the most distant chance of being successful, even if they possessed the integrity of More, the inventive faculty of Brindley, Watt, and Stephenson, or the science of Newton and Faraday. These qualities, unfortunately, are no more than a spider's web when placed in opposition to the mysterious influence of clanism and moneyed ascendancy. It is now time to examine the foundation of the qualifications of, at least, one of the examiners, and the infatuation which operated on the mind of the Home Secretary to induce him to make such an appointment. And if the evidence which I shall advance be such as to induce an inference by no means favourable to the reputation of Mr. Wood, I hope that gentleman will not attribute the circumstance to any other cause than the right one—viz., a desire to enlighten the minds of my fellow-workmen, by presenting them with truth in its naked freshness and beauty. I conceive there is but little danger in the declaration that there are but few men of sound judgment and probity who will deny that every examiner of the claims of others should be in the possession of the following credentials:—

1. Honesty, sincerity, and sympathy in the object for the accomplishment of which the Government inspectors are appointed. If the examiner is opposed to an increase of Government inspection, as unnecessary, is it not likely he will recommend those who will minister to his own foibles, even at the cost of thwarting the benevolent intentions of the Legislature.

2. Commanding scientific and practical attainments, so as to be able to test, with a critical discernment, the capabilities and claims of the various competitors for Government patronage.

3. He should be in full possession of physical and mental vigour, with an aptitude, which experience in this respect alone can develop, to seize the most prominent points in the subjects of examination, and place them clearly before the individuals examined.

I state these qualifications fearlessly, and with a full conviction that they will obtain the approval and support not only of my fellow-workmen, but of every disinterested and enlightened man in this country, and now proceed to test by them the claims of Mr. Wood to occupy the distinguished position which his unscrupulous ambition has forced upon him. In the first place, then, I shall quote from the minutes of evidence before the Select Committee of 1854 the celebrated resolution which the *savans* at the Craven Hotel unanimously adopted, and requested their Chairman, Mr. Wood, to carry it triumphantly to the committee, as a precious memento of the humiliating position into which intrigue, selfishness, aggrandisement, and clanism, will plunge individuals, in spite of their better judgment and higher intellectual perceptions. At a meeting of coalowners and mining engineers, the following resolution was adopted:—"That in the opinion of this meeting an additional number of inspectors is not necessary." Is it requisite to make any comment on this resolution of the coalowners and scientific viewers? Does it not incapacitate any of them from taking an active part in the appointment of Government inspectors—an office which they conceive to be unnecessary, and which will scrutinise too freely, if properly executed, their questionable modes of making princely fortunes? If they are not the greatest hypocrites living, will they not do their utmost to appoint, or cause to be appointed, agents in strict conformity with their published and private opinions, which are in direct opposition to the intentions of the Act of Parliament? But this does not reach the climax of the learned *savans* at Craven Hotel; they push a step further in their obstinacy and imbecility, by verifying the adage, "there is but one step between the sublime and the ridiculous," in the adoption of the following:—"But in the event of an additional number of Government inspectors being thought necessary, the object of the prevention of accidents would be best promoted by the appointment of persons of sound practical knowledge and experience, of not less than 10 years' standing as practical managers of collieries." These quotations may be expressed in other words:—"We do not believe in the necessity of Government inspection, but if the committee and Sir George Grey do, then we are the men to be Government inspectors." What a sublime and magnanimous conception these coalowners and scientific viewers have of the discernment and honesty of the Home Office? and the sequel of these appointments will show how correctly they reasoned, for Mr. Nicholas Wood, the Chairman of this meeting, was installed in the important office of examiner of the candidates, consisting of men of his own class, for Government inspectors! Fellow-workmen, you can judge, perhaps, as well as a Minister of State as to the ability of Mr. Wood to comply with the first credential which I have ventured to state. I shall now turn to Sir George Grey, who is responsible to the public for these appointments, and to whom he must ere long give an account of his stewardship, and respectfully state to him that I have no wish to aggravate the position into which a too ready compliance with the clamorous representations of the scientific viewers has placed him, by a recapitulation of recent events in connection with Government appointments at the Admiralty and the Horse Guards. "I could a tale unfold," &c., but this must not be, as the simple quotations and inferences which I have drawn from them are ample to show that the discrimination of Sir George, in the appointment of examiners for Government inspectors, was neither acute nor entirely free from grave suspicions. I shall now examine Mr. Wood on the second credential, of which he and his colleagues are so proud—viz., his scientific pre-eminence. It will not be necessary to follow him through the pages of his voluminous works, but simply to make a few quotations from the minutes of evidence taken before the Select Committee on Coal Mines, 1852. The errors which he stated before the Committee of the House of Lords in 1849 were considered of sufficient importance by the committee of 1852 to justify them in receiving the enlightened demonstrations of Prof. Hann, with a view to correct such grave blunders as those committed by Mr. Wood when examined on the subject of ventilation, which all must confess afforded him ample scope for the display of pure and mixed science. In answer to certain queries put to him by the committee, Prof. Hann, formerly a pit boy, near Newcastle, than whom a greater authority on this subject does not exist, replies—"I found Mr. Wood's theorem and calculations were quite wrong."—"He has given a great number of calculations; it is impossible to go into everything he has given in his evidence; it is very extensive, and vitiates everything founded upon it."—"He wanted to show what the drag of the mine was—what the friction and resistance were; there he was completely wrong."

What, then, I ask, becomes of Mr. Wood's claim to pre-eminence as a man of science? Surely the Home Secretary and the scientific viewers have some self-existing standard, unknown to men of science, to which they refer for their decisions on vast and momentous questions. Here is a gentleman giving evidence before the highest tribunal in the land, on a subject, too, upon which all must admit his position and his interests have urged him to bestow every consideration which science could suggest, and which practice and a grasping ambition could enforce. And I will fearlesaly ask any rational man, whether a correct acquaintance with the very rudiments of mechanical science would not have directed his contemplations into channels of greater certainty, and, of course, more trustworthy, than those to which I have been compelled painfully to refer? I am now ready to enquire, if pure science ever shed an inward ray on the mind of the examiner? Has he not been educated entirely from without, and urged onward by that sordid ambition which has enslaved, not elevated and refined, the unfortunate instruments that have contributed to his success? With respect to the qualification of mental and physical activity, it is sufficient to mention that Mr. Wood is nearly seventy years of age, if not quite. Has he had any experience in conducting an examination?

Such, fellow-workmen, are the claims to consideration, on public grounds, of the very man who has been appointed to carry out the grave question of diminishing the number of fatal accidents in coal mines. I shall not ask you if these qualifications are worthless and contemptible, but avail myself at once of every Englishman's privilege, and respectfully ask the Home Secretary, if he thought his questionable proceedings in this particular would be obliterated in the mighty shadow and horrid gloom which similar appointments have unhappily produced in the Crimea and in the Baltic? Were there not several working colliers whose claims and qualification far transcended those of Mr. Nicholas Wood, and still were rejected in silent contempt?

It requires considerable fortitude at all times to bear up with dignity against a just defeat in the arena of mental strife; but who has given Sir George Grey the will and power to aggravate the bitterness of this position, by the reflection of not having been considered worthy to enter the list of combatants in the honourable conflict for social distinction? Every candidate for a Government inspector had a right to a public examination before an unbiased tribunal; and I feel certain that a slight reflection on the part of Sir George Grey will convince him that he has not only unnecessarily wounded minds as susceptible and as dignified as his own, but checked the advance of education and the best interests of labour, by allowing the clamorous representations of the committee and scientific viewers to prevail over the just demands of the colliers' representatives and the cause of humanity. *Aurum omnes victa jam pietate colunt*,—that is, "All men now worship gold, all other reverence being done away." "The age is become so venal, that nothing is respected but wealth and its possessors." In conclusion, I beg to thank "Ops" for his successive remarks, and also to assure him that I have not the slightest ambition to become distinguished as a literary correspondent, either in the pages of this or any other Journal. My defects are too obvious to my own judgment ever to aspire to the position indicated by him; but, still, I have a duty imposed upon me, and, I trust, by the assistance of Him "who stills the raven's clam'rous nest, and decks the lily fair in flow'ry pride," to be enabled to discharge it with fidelity, and with benefit to my fellow-workmen. The man who has to labour for every advantage and comfort he and his family enjoy, has not time at his disposal, even if he had the ability and inclination, to produce exquisitely smooth sentences, which, by-the-bye, too frequently leave on the tablet of the memory but a faint impression of their freshness and vitality. It is fortunate that the cause of humanity does not require the natural dignity of Shakspeare, the acquired majesty of Milton, or the sweet chasteness of Addison, to recommend it to the coal miners; they are too familiar with the slavery to which they have been doomed by the grasping cupidity of their employers, not to be deeply interested in any measures which profess to ameliorate their condition. I cannot refrain from expressing my conviction that "Ops" has appropriated to himself a very useful and important office,—viz., to collate, and weigh in the unerring balance of Justice, the correspondence of this Journal, which shows the feelings, and affects the interests, of so many thousands. As "one good turn deserves another," allow me to suggest that, if "Ops" were to cast to the winds the levity in which he sometimes indulges, and approach the subject of his theme with earnestness and caution, he would confer on society a lasting benefit, and enhance considerably the value and importance of the correspondence in the *Mining Journal*.

COAL MINER.

MANUFACTURING CASKS BY MACHINERY.—Among the numerous applications of steam machinery to the useful arts, with a view to economise labour and render manufactured articles more perfect, several inventions for the construction of casks and cooperage have been patented and brought into operation, but hitherto without that complete success which renders machinery a perfect substitute for hand labour. Nor is this surprising, for, taking into consideration the difficulties of the cooper's art, there does appear many obstacles to the perfect formation of a barrel otherwise than by hand labour. We have, however, been much gratified during the week by an inspection of some cask-making machinery patented by Mr. James Robertson, and now in full operation at the Steam Machine Cooperage, Hungerford-street, Commercial-road, which for simplicity of action, completeness of detail, and perfection in the result of its operations, leave nothing to be desired. In the first operation, the rough staves are cut by circular saws, and are then smoothed and jointed by gigantic planes, continually in horizontal motion, the staves being pressed up against the cutting blades by attendant boys, until the proper curve is attained. The necessary number of these to form a cask being set up in a truss hoop at one end, it is placed under an iron receiver, similar to a gas holder, and there subjected to the action of high-pressure steam, which renders the wood pliable, and extracts the gallic acid and tannin, which have an injurious effect upon many liquids; by these means, too, the objectionable practice of charring, which will impart colour, is avoided. The embryo cask, in its one-truss hoop, is then brought to a machine called a "trusser," consisting of an iron mould or box, exactly fitting half the cask, on a moveable bed-plate, and another similar one fixed above, with the open end downwards. In these are recesses to hold the required number of truss hoops. The cask is put in the lower mould, the bed-plate slowly rises by the action of an hydraulic press, forcing the spreading staves into the bell mouth of the upper one, until all is pressed close together, when the trusser is opened, and the cask comes out perfect in shape, with all the truss hoops on it complete. It is then placed on a rapidly revolving disc, and coming in contact with a cutting tool, the chime is properly formed, and by another motion the "croze," or groove, is made, in which the head is to be fitted. The boards to form the head, after being cut and planed, are dowelled together by hand in the usual manner, and are then placed on a vertical lathe, managed by a boy, who can in half a minute finish one in a more perfect manner than the most experienced cooper. The cask has now to be headed and hooped, and comes out a most perfect utensil, highly finished in all its parts. On entering the premises, the first thing which strikes the spectator is the number of boys at work in every department; the whole of the machinery being almost self-acting, the labour of youth is found to be as efficient to guide it in its various operations as the skilled labour of man in the construction of casks by hand; and among the advantages claimed for this system is the consequent great saving of labour, enabling casks to be manufactured at a much cheaper rate than by the old process. The action of the various machines is marked by great rapidity and precision, and it is most interesting to watch the progress of each individual portion continuously advancing towards completion, to form one finished whole. The entire combination of machinery is highly ingenious, does great credit to the inventor, and casks made at this establishment are pronounced to be quite equal, if not superior, to those generally made by hand.

THE MANUFACTURE OF ALLOYS, OR COMBINATIONS OF METALS.

It is a curious, but nevertheless an undeniable fact, that no kind of manufacture has received less benefit from the recent progress of chemical knowledge in this country than the fabrication of alloys. This is all the more surprising, when we consider the enormous field open to enquiry, and the richness of the harvest to be there gathered. A new allow is really a new metal given to society; and although the apathy of scientific men with respect to the subject has hitherto led to the production of very few such metals, yet more than one example may be cited where a large fortune has followed upon an invention of this kind. So completely, however, has Science closed her eyes to this uncontested arena of profitable improvement, that the very word "alloy" has received no chemical definition in the latest scientific works; and hence we are compelled to begin our present observations by defining its meaning with regard to the past, the present and its probable future.

The origin of the word, as applied to metallic compounds, is no doubt coeval with the age of the so-called "noble" and "base" metals; a form of language naturally leading to the conclusion, that when any noble metal was mixed with a base one, its nobility was "allayed" or "alloyed," and consequently diminished. In this sense, the base metal came to be regarded as the allay or alloy, and as such is thus described by an old writer: "Alloy is the proportion of a baser metal mixed with a finer or purer; as the quantity of copper that is mingled with gold, to make it of a due hardness, is called the alloy;" and with this meaning, the word is still used by our assayers of gold and silver. But it is clear, from the very nature of the example here chosen, that no admixture of one base metal with another like itself, could generate an alloy in the opinion of writers of the old school; nor can we anywhere find that brass, bell-metal, &c, were called alloys, until mixed with gold or silver.

If, however, we now proceed to examine the meaning of the expression alloy, in the present day, we shall find that it extends to every admixture of two or more metals, and is, perhaps, no less absurdly diffuse than it was previously limited. On the new system, 99 parts of gold and one of copper is an alloy of gold; whilst 99 of copper and one of gold is an alloy of copper: nor is there any fixed or recognised limit at which an admixture of metals ceases to bear the name alloy: in fact, almost every metal we now use might, from its casual impurity, come within the boundaries of this definition. Lead, with a trace of silver, will thus be an alloy of lead; and iron containing a trace of manganese an alloy of iron. Such a state of things cannot fail in the end to produce uncertainty and confusion; therefore we propose to establish, for present purposes at least, a distinction betwixt what we shall call an alloy of metals and an admixture.

Many years ago Dr. Dalton drew attention to the fact, that many of the alloys in ordinary use, as brass, &c., were very nearly atomic compounds, or, in other words, mixtures of metals in such proportions, that one combining equivalent of the one was united with one, two, or three equivalents of the other; and this peculiarity was found to extend to what may be termed native or natural alloys. Thus, brass of good quality consists of about 34 zinc and 66 copper in 100 parts, which is very nearly in the proportion of one atom of zinc to two atoms of copper; and again, the native of alloy of gold and silver, called "electrum," is said by Boussingault, to consist of two atoms of gold and one of silver. In fact, many such examples might be pointed out in support of Dalton's opinion, though it is quite certain that in this, as in many other of his assertions, he carried his views too far, and was misled by his mathematical bias. Silver and iron, for example, refuse to unite permanently, and separate on cooling; but the iron retains, in this case, a small and variable quantity of silver, whilst the silver retains a little iron: similarly lead and zinc comport themselves; and in neither instance can any reasonable grounds be found for inferring that an atomic combination has ensued. It would appear, therefore, that the union of some metals in atomic proportion can be effected, whilst with others it cannot; and hence, for the former we propose to retain the word "alloy,"—using the expression "combination of metals" for the latter. On this basis, therefore, an alloy will mean a mixture of one or more atoms, or equivalents of one metal, with one or more atoms or equivalents of another, so as to form what may be called a chemical compound, whereas a "combination of metals" will merely imply a mixture in no definite proportions, but suggesting the idea of a mechanical compound: thus, brass formed from 34 parts of zinc and 64 parts of copper, or 34 zinc and 96 copper, would be an alloy,—whilst our ordinary silver and gold coinage would be an admixture of metals.

With this preliminary definition, we will now proceed to examine the few alloys in common use in the arts, or, more correctly speaking, those compounds which nearly approach the nature of alloys. In such a list we may place brass, type-metal, bell-metal, speculum-metal, pewter, Britannia-metal, and solder. The first has already been described; the second generally consists of about 5 parts of lead and 1 of antimony, which closely approaches to 3 atoms of lead and 1 of antimony. Bell-metal is composed of 4 parts of copper and 1 of tin, and may be regarded as an alloy of 7 atoms of copper to 1 of tin. Speculum-metal contains about equal quantities of copper and tin, with small and variable proportions of arsenic: it may, consequently, be looked upon as composed of 2 atoms of copper and 1 of tin. Pewter and Britannia-metal are triple compounds of tin, antimony, and lead, in which the proportions approach, for the first, an atom of each ingredient, and for the second 3 atoms of tin, 2 of antimony, and 1 of lead. Solder is more variable than any of the others: but the best kind is made with 3 parts of lead and 1 of tin, which corresponds to about 2 atoms of lead and 1 of tin. There are other compounds which might, perhaps, have been brought within this group; but as, in reality, none even of those we have selected, are, strictly speaking, alloys in our limited sense of the expression, it is useless to follow the subject further, than to show, by this near approach to atomic combination, how probable it is that the same substances, fabricated with a due regard to that proportion, would possess more useful qualities, and less frequently disappoint the expectations of the artisan. Take, for example, the case of bell-metal, an article notorious for the uncertainty of its results: this compound contains, according to the caprice of its fabricator, from 12 to 22 parts of tin, with from 78 to 88 parts of copper, and a little antimony, arsenic, or even iron: if, however, it requires to be an alloy of 7 atoms of copper and 1 of tin, the proper proportions would be 79 copper and 21 tin. With facts of this kind before our eyes, it certainly does seem strange that nothing practical has arisen in this country with respect to alloys; and we cannot help thinking that amongst the other elements of the working man's education, the doctrine of definite combining proportions might very properly be included. It is, in fact, the "golden rule" of practical philosophy, and, once learnt, can never be forgotton: by its unerring agency the discoverer is led on in a safe and economical path, far removed from the vicissitudes of chance and the errors of experiment. Let us imagine, for instance, that an artisan, after much labour, has ascertained that a certain mixture of two metals will answer the purpose he requires: this man must rest content; or, if he thinks of improvement, it can only be in the hope that accident will one day furnish him with a hint; but, guided by a knowledge that substances have a tendency to form stable and uniform compounds only when they unite in atomic proportions, he would immediately examine the quantities he had found effective; and, if these approached within certain limits, he might easily make a correction, with a full assurance of a successful issue. And wherein resides the difficulty of teaching such men the simple doctrine in question? There is, in fact, but one difficulty, and that is to provide teachers. In all our systems of education the importance of imparting practical knowledge is much overlooked; and this is especially the case with the lower orders. As, however, it must be at all times more commendable to convert a workman into a philosopher than a philosopher into a workman, we trust the day is not far off in which the head and the hand of the same individual shall be able to work in unison.

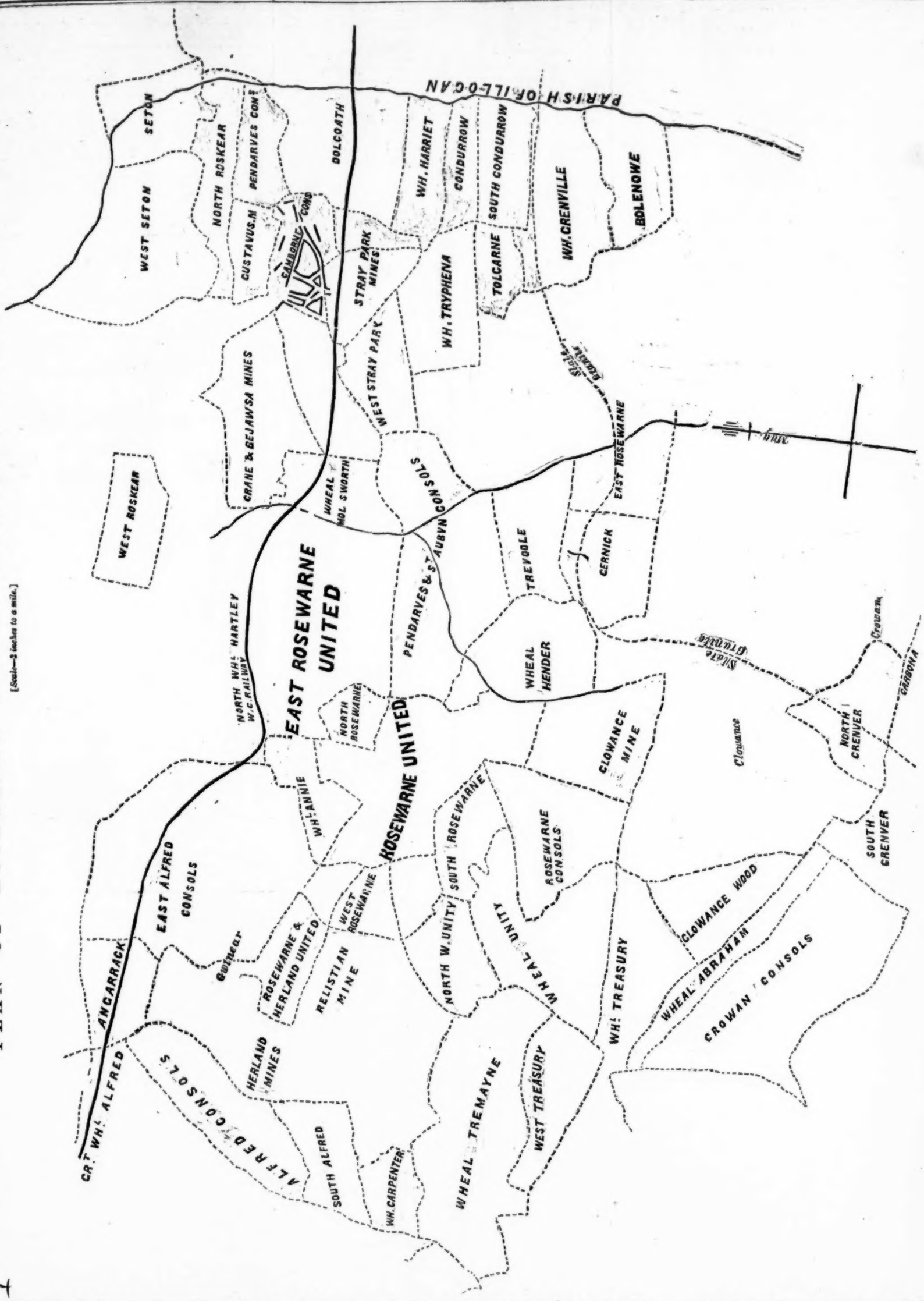
Quitting the subject of alloys, the more extended question of metallic combinations presents itself; and inasmuch as that nearly the whole of the metallic articles now manufactured belong to this class, the investigation seems almost endless.

[From Newton's *Journal of Arts*.—To be continued in next week's *Mining Journal*.]

*** MINING JOURNAL.—The VOLUMES for 1854 and 1855, perfect, with Index and Title-page, strongly bound, to be sold—price 21. each.

PLAN OF ROSEWARNE MINING DISTRICT, CORNWALL.

[Scale—3 inches to a mile.]



The important character of the ROSEWARNE UNITED MINES, in the parish of Gwinear, resulting from the large amount of copper ore already sold, and the extensive reserves of ore opened therein, has given rise to the designation of "Rosewarne District" to the group of mines in that neighbourhood. The name Rosewarne is taken from the name of the land in the western part of the sett, the property of Mr. Huthnance, of that place, to whom I offer my congratulations on account of his good fortune. He is connected with the mines in three capacities—viz., as landowner, shareholder, and purser. These mines furnish one instance amongst many of the *misses* of preceding workers. The present company did very little in the way of driving or sinking before the riches were explored. The Devon Great Consols is another example, as your readers well remember. The other lands constituting the sett belong to Mrs. Hartley and the Rev. H. M. St. Aubyn. The mines are looking well, although some panic has reduced the shares below their legitimate value—so I apprehend. There are five lodes in the sett, one of which goes through Wheal Hender, and the others through East Rosewarne United.

NORTH ROSEWARNE is a very small sett, in which little is being done at present, but the company will, probably, put on more force this spring. The position is good.

EAST ROSEWARNE UNITED is a large sett, also in Gwinear, eastward of Rosewarne United, as its name implies, and having the lodes thereof passing through it. It is believed, also, that some of the Dolcoath lodes pass through it, and that the lode containing the silver in this mine is identical with the silver lode in Dolcoath, which was so very rich some years ago; however that may be, one thing is certain, that silver ore, worth 10*l.* per ton, can be raised from one of the six lodes in this mine. This mine was worked about 40 years ago on a small scale; it is about to be reworked out of a subscribed capital of 2000*l.*, which, with the expected produce at the adit level, will probably be sufficient. The existence of the silver at the former working was unknown.

SOUTH ROSEWARNE adjoins Rosewarne United at its southern side. Most of the lodes are parallel in the two mines; but a counter lode in Rosewarne United is said to go through South Rosewarne. This mine is also in a good position, but the working is not very energetic at present.

ROSEWARNE CONSOLS occupies all the ground between South Rosewarne and Clowance wall: a large sett, through which, the captain says, eight or nine lodes pass. Clowance counter, which yielded large returns 40 years ago, is one of them.

WEST ROSEWARNE is immediately west of Rosewarne United, and has the Rosewarne productive lode running the length of the sett. The difficulties encountered by the promoters were extraordinary, and will form the subject of a letter on a future day. This mine is almost certain to be a prize to those who hold on.

EAST ROSEWARNE UNITED is a name applied to a sett lately worked slightly by Mr. F. Pryor and Co., under the name of Carnwynen, in Crowan. It adjoins GERNICK on the east.

ALFRED CONSOLS is too well known to require remark. The dividends give it a world-wide celebrity. The shareholders number nearly 1000!

GREAT WHEAL ALFRED has not yielded profit on the present working, so far; but the adventurers should not despair, as it is likely that their original expectations will not be disappointed. The first adventurers got about 90,000*l.* out of it.

SOUTH WHEAL ALFRED adjoining the last named mine, is in the hands of a good agent (Capt. Rutter, of South Crofty), but for want of means he is restricted from an effectual working, of which it is said to be worthy.

EAST ALFRED CONSOLS is a large sett unwrought, but offering a field for operation, and so NORTH ALFRED.

RELISTIAN yielded a large profit at the last working to the 80 fm. level. Although the old mine is "worked out," the ground at the west, taken up by Mr. Hollow, of Lelant, and called SOUTH HERLAND, is said to be a good speculation, and so is ROSEWARNE and HERLAND UNITED, to the north

of Relistian. The latter, is a very old mine, and being re-worked by Capt. H. Stephens and Co.

HERLAND MINES were very rich, but are not, probably, worth further trial. No mine is rich for ever.

WHEAL ABRAHAM AND BINNER DOWNS were rich also, and are believed to be well worthy another trial. They were worked for copper only. An immense quantity of tin is said to have been thrown away amongst the rubbish. These mines are deserving the attention of capitalists.

CROWAN CONSOLS, which takes in a part of Wheal Abraham sett, is on the eve of being worked by an influential London company, with good prospect of success. Capt. Charles Thomas, of Dolcoath, Capt. Floyd, and others, recommend it strongly.

WHEAL TREASURY is being re-worked, in connection with Clowance Wood, by Capt. Thos. Richards and Co., with every prospect of success. Wheal Treasury was a rich mine, and so was West Treasury, which is now idle, but will probably be set afloat again.

WHEAL UNITY is partially suspended, but I hear that a good discovery has been made of copper ore at a shallow level. This may lead to a revival of the mine.

NORTH UNITY is in a good condition, and likely soon to pay dividends.

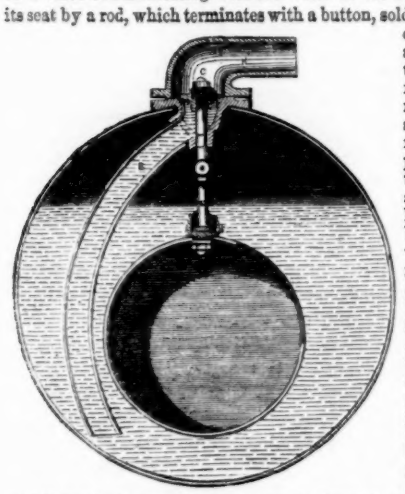
TREMAYNE AND WEST PROVIDENCE have been good mines; the latter is so now.

WHEAL HENDER is the same as Copper Bottom, which was rich for a short period; but the productive lode in Hender is not that which yielded the ore in Copper Bottom. This is a highly promising speculation, if my information be correct.

The space at our command this week will not permit any extended remarks on the Rosewarne district. The mines named above are in the immediate locality of Rosewarne United Mines.

SAFETY APPARATUS FOR STEAM-BOILERS.

Mr. W. Kemble Hall, of the United States, exhibits at the Society of Arts an apparatus for the prevention of steam-boiler explosions, consisting of a valve communicating with the water in the boiler, and retained in its seat by a rod, which terminates with a button, soldered with tin or other easily fusible metal, in a copper cup, riveted to the crown of the furnace. The arrangement will be more easily understood by reference to the accompanying diagram. If the water become low, and the boiler overheated, the valve will be released, and the water and steam blown from the boiler, which consequently, cannot be exploded, although it may, by the negligence of the stoker, be destroyed. At the Institution of Civil Engineers an interesting paper, "on the Causes of the Explosions of Steam-boilers," was read by the inventor, and in the discussion which resulted, several instances were given of explosions of locomotive boilers, presenting many apparent peculiarities, which were, however, all referable to natural causes; in some cases, a series of very peculiar circular holes, and in others grooves, were found, extending all round the interior of the shell, near the rivets. The boilers had failed below the part where they were weakened by the bending over, probably a little too sharply, of the plates. In all cases would the apparatus be a valuable adjunct, whilst in none could it be prejudicial. The double-flue Cornish boiler was mentioned as being preferable to the single firing-flue; the surface exposed was more extensive, and the construction was stronger; the depth of water above the flue was greater; and firing could be alternate. All these were admitted advantages.



It was stated that the observed cases of corrosion of the plates of boilers might be referred to galvanic agency, and instances were given of such effects being produced when the bilge-water was taken up by the feed-pumps and injected into the boilers. The sections of metal torn asunder frequently presented proof of an instantaneous generation of explosive power, whether produced by over-heated plates, or any other cause; and as the method of discharging the water and the steam from a boiler, and extinguishing the fire, would appear to be the most effectual mode of preventing danger, it would be only reasonable to employ so simple a precaution as that offered by Mr. Hall's apparatus.

The opinion as to the little confidence to be placed in self-acting apparatus in general was agreed with; but it was submitted that the self-acting looms, and other machines of that class, and the automatic action of the eccentric upon valve-gear, and other similar arrangements, would warrant deviation from the rule, under certain circumstances, among which was placed that of the spontaneous dicharge of the water and steam from the boilers when in dangerous condition.

The causes of explosions might, at first sight, appear difficult of discovery, but careful investigation generally brought to light evidence of some condition of the boiler under which an accident would be inevitable. Explosions might generally be attributed to simple causes; and it was far better to seek for them than to raise theories upon some occult causes, the existence of which was very problematical. It was generally admitted that the apparatus introduced by Mr. Hall would be effective in preventing accidents.

IMPROVED COLLIERY PUMP.—Mr. Richard Steeple, of Waterloo Main Colliery, near Leeds, has forwarded us a diagram of an arrangement of pumps for mining purposes, which suggested itself to him from his set of pumps being too small for the work, and by which he could largely increase the supply, still keeping in use the small pipes as the rising main. It is a double action pump, with a common bucket. The working barrel is 12 inches diameter, and the delivery pipe 9 inches; and as the former ascends, it will overcharge the rising main, forcing a portion of the water into the air-vessel, and so compress the air in the upper portion that, when the bucket descends, this compressed air will re-act on the water, and force it up the rising main, thus keeping up a constant discharge.

THE MOTHERWELL IRON WORKS, formerly belonging to the West of Scotland Malleable Iron Co., now to the Glasgow Iron Co., of which Mr. James Reid, of Messrs. John Stewart and Co., and Mr. Cassels are leading partners, are working four shifts a week—the full time in busy seasons being five shifts. There are some features in the management of these works peculiarly creditable to the company. They do not "fettle" the furnaces on the Sunday, as used to be the case, so that the Sabbath rest of the men is respected. They insist on all the men being paid in cash. They keep no store themselves, and allow none of their clerks, cashiers, or managers to have anything to do with stores, or to have any connection by "lines" with shops. Their late cashier was at once discharged when it was found that he had gone into connection with a store. The puddling furnaces are close upon 40 in number, each employing two puddlers and two underhands. A puddler can make 13s. a shift, or 82s. a week, out of which he pays his underhand about 12s. a week. A large number of operatives are employed at the rolling mills, there are close on 500 men altogether, including puddlers, rollers, furnace-men, engine-drivers, carters, smiths, wrights, fitters, bricklayers, &c. A good many of the hands are Welshmen, and the houses of some of them show English taste and tidiness.

PERFORATED, OR SOLID BRICKS.—Some experiments have lately been made at the engineering establishment of Messrs. John Rowan and Sons, Belfast, on the comparative sustaining power of patent perforated bricks (Beart's patent, we believe), and bricks of the ordinary kind. In each case a pier of four courses of the bricks to be tested was built, in Roman cement, on the table of a powerful hydraulic press, and allowed at least 24 hours thoroughly to set. A light scale board was suspended to the safety-valve lever of the press, on which there were placed successive weights, until the pier of bricks on the table of the press was crushed. The number of weights was increased a quarter of a pound at a time (being equivalent to an increment of 10 tons on the press), commencing at 30 tons, this starting-point being the effect due to the united weights of the level and scale board. The pump was worked very slowly, to eliminate the concussion produced otherwise by the inertia of the water. The first experiment was made with good ordinary brick, in a pier of 18 in. square, built in four courses. This showed symptoms of falling with 110 tons, and was crushed with 150 tons. A pier of the same dimensions of perforated bricks began to crack with 270 tons, and was crushed with 350 tons. Sir John M'Neil having expressed a desire to witness a repetition of these experiments, at his request a pier of 9 in. square of each kind of bricks was built in cement, in four courses as before, and with especial care to have the joints as thin as possible. The common bricks failed with 40 tons, whereas the pier of patent bricks sustained 120 tons before it was crushed. Reducing the result of these experiments to the effect upon a superficial foot, common bricks, in the first experiment, were crushed by 66⅔ tons to the square foot, and by 71 1-9 tons to the second, the mean being 68 8-9 tons. Patent perforated bricks were crushed in the first experiment by 155 5-9 tons per superficial foot, and in the second by 213½ tons, the mean being 184 4-9 tons.—*The Engineer.*

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This company is formed for developing and working Wagstaffe and Perkins's patent for extracting metals from ores by means of chemical agencies, in combination with electro-metallurgy, an effectual and inexpensive process, as it enables the miner to obtain separately the various metals contained in the ores at a great saving of expense, as compared with the present inefficacious and costly process of smelting.

Under the existing system, tin, which is mixed with copper more or less, sometimes to a considerable per centage, is not usually separated from the copper, so that an admixture of copper and tin ore is obtained at a depreciated price; whereas, by this company's process, which may be carried on at any mine, these metals will be obtained separated, and consequently sold at enhanced prices to the producer.

So, under the existing system, much of the silver contained in the silver-lead ores, to the extent of many ounces to the ton of metal, is sold in combination with the lead of commerce. This large quantity of silver is entirely lost, not only to the miner but to the community at large, and the miner obtains for such admixture of lead and silver little more than the value of the lead alone; but by this company's process the whole of the silver will be separated from the lead, whilst the latter metal can be obtained in any desired commercial form, a desideratum long sought but never before effected.

The average quantity of copper ore smelted annually at Swansea is 200,000 tons, chiefly copper pyrites. The total amount of sulphur contained therein may be estimated at from 45,000 to 50,000 tons, which is at present eliminated with the atmosphere as sulphurous and sulphuric acids; and averaging the cost of sulphur at 7*l.* per ton, the profits from this source alone, if collected, as it will be by this process, as sulphuric acid in a commercial form, would leave a profit of not less than £445,000 per annum.

It appears from the report of the Geological Society for 1855, that in 1854 the quantity of copper ore raised in Great Britain was 200,658 tons, or 14,192 tons of metal; of lead ore, 90,553, or 64,005 tons of metal; of tin ore, 8747, or 5497 tons of metal; and of silver, 562,659 ounces—the total value of these four products being £3,584,422. In 1853 the yield was rather less, being of metallic copper, 11,913; of lead, 61,031; of tin, 5703 tons; and of silver, 496,475 ounces.

The year 1854 may be taken as a fair average, and it is evident that a vast income will arise, even though a small royalty only should be charged on this large amount of property. Assuming, for example, that only a tithe of the above amount came under the operation of this patent—say to an extent in value of £350,000,—and that 5 per cent. be charged thereon, a revenue of £17,500 per annum would accrue to the company, clear of every expense. This is on the depreciated value of the produce, not taking into consideration the improved value of the several substances under this process. If a royalty per ton were charged of, say 10s. on a tithe of the aggregate tonnage of copper, lead, and tin ores in 1854, it would produce an income of nearly £15,000. The silver is here calculated in the lead ore, for the report in question justly remarks, that "a large quantity of lead passes into consumption from which the silver is not separated." In referring to 1853, the report estimates the yield of silver at 700,000 instead of 496,475 ozs., the quantity returned on assay showing a clear loss of 203,525 ozs., equivalent to more than £55,000 per annum, which by this company's process would go into the pockets of the miner.

The ores imported would likewise come under the influence of this company. The quantity of copper ore imported in 1854 was 50,000 tons, the greater proportion Australian ore, which contains much silver; this at a moderate royalty will produce a further large income, and the whole of the silver saved by the importers or proprietors.

Besides, there are many valuable chemical results from this process; namely, the formation of salts and acids of commercial value—such as sulphuric acid, nitrate of soda, or potash, &c.—in lieu of the waste resulting from other methods; and the metals in solution in waters of mines, which will be used in the processes as solvents of other metals, in combination with the various acids, will be collected and converted into a new source of profit.

The chemical process will confer a great benefit on mining property, and render mixed and poor ores remunerative; it is, therefore, proposed to grant licenses to mining companies, charging a royalty per ton upon the ores operated upon, or of farming the patent, as may be agreed upon, where the localities may be distant from the works of the company, which of itself would be a source of vast benefit, without any other outlay than of occasional inspection or supervision. The process is so simple that it may be carried on under supervision at any mine.

Works will be established forthwith in the vicinity of London, for the reduction of the different ores brought to the metropolis, and also for the practical instruction, under the superintendence of Mr. Perkins, of the persons who may be appointed to carry out the process at the different mines where the patent may be in operation. It is also proposed to have works subsequently at other suitable places, in order that imported as well as indigenous ores may be brought under this process, and that the cost of freight may thus be saved.

The affairs of this company will be conducted with strict economy, and all accounts will be balanced monthly. The books of the company will be open to the inspection of the shareholders.

The advantages not only to the shareholders in this company, but also to all those who are interested in mining operations, are at once apparent; the one by the outlay of a limited amount of capital may derive a high per centage, and the other will not only effect a considerable saving, but will also secure an enhanced price for his ores, whilst he will likewise turn many valuable materials now lost to a great profit.

This company has secured the monopoly of the patent for Great Britain and Ireland, the Channel Islands, and the Isle of Man, for which the patentees accept one-third of the capital, and a small royalty on all ores or metallic materials operated upon during the patent privileges.

The proposed capital is 30,000*l.*, to be raised by 10,000 shares of 3*l.* each, on which will be required a deposit of 10s. per share on application for, and 10s. on appropriation of, shares. The remainder to be paid in two instalments of 1*l.* each, at intervals of not less than four months, and on not less than one month's notice.

Applications for shares may be made to the solicitor, or to the manager, in the annexed form, where prospectuses, and all particulars and information, may be obtained.—London, March 26, 1856.

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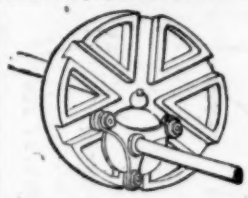

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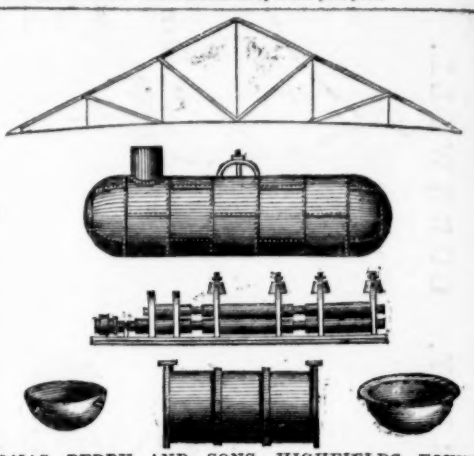

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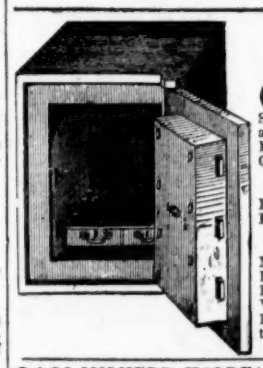

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